National Institute of Environmental Health Sciences

Climate change impacts on the leaching of a heavy metal contamination in a small lowland catchment

Author(s): Visser A, Kroes J, M THvV, Blenkinsop S, Fowler HJ, Broers HP
Year: 2012
Journal: Journal of Contaminant Hydrology. 127 (4-Jan): 47-64

Abstract:

The Keersop catchment (43km(2)) in the south of The Netherlands has been contaminated by the emissions of four zinc ore smelters. The objective of this study was to assess the effects of future projected climate change on the hydrology and the leaching of heavy metals (i.e. Cd and Zn) in the catchment. The numerical, quasi-2D, unsaturated zone Soil Water Atmosphere Plant model was used with 100-year simulated daily time series of precipitation and potential evapotranspiration. The time series are representative of stationary climates for the periods 1961-1990 ("baseline") and 2071-2100 ("future"). The time series of future climate were obtained by downscaling the results of eight regional climate model (RCM) experiments, driven by the SRES A2 emissions scenario, using change factors for a series of climate statistics and applying them to stochastic weather generator models. The time series are characterized by increased precipitation in winter, less precipitation in summer, and higher air temperatures (between 2 degrees C and 5 degrees C) throughout the year. Future climate scenarios project higher evapotranspiration rates, more irrigation, less drainage, lower discharge rates and lower groundwater levels, due to increased evapotranspiration and a slowing down of the groundwater system. As a result, lower concentrations of Cd and Zn in surface water are projected. The reduced leaching of heavy metals, due to drying of the catchment, showed a positive impact on a limited aspect of surface water quality.

Source: http://dx.doi.org/10.1016/j.jconhyd.2011.04.007

Resource Description

Climate Scenario :

specification of climate scenario (set of assumptions about future states related to climate)

Special Report on Emissions Scenarios (SRES)

Special Report on Emissions Scenarios (SRES) Scenario: SRES A2

Exposure :

weather or climate related pathway by which climate change affects health

Food/Water Quality, Precipitation, Temperature

Food/Water Quality: Other Water Quality Issue

Water Quality (other): Zinc;Cadmium

Geographic Feature: ☑

resource focuses on specific type of geography

Freshwater

Geographic Location: ☑

resource focuses on specific location

Non-United States

Non-United States: Europe

European Region/Country: European Country

Other European Country : The Netherlands

Health Impact: ☑

specification of health effect or disease related to climate change exposure

Health Outcome Unspecified

Mitigation/Adaptation: ☑

mitigation or adaptation strategy is a focus of resource

Adaptation

Model/Methodology: ☑

type of model used or methodology development is a focus of resource

Exposure Change Prediction

Resource Type: ☑

format or standard characteristic of resource

Research Article

Timescale: ☑

time period studied

Long-Term (>50 years)

Vulnerability/Impact Assessment: ☑

resource focus on process of identifying, quantifying, and prioritizing vulnerabilities in a system

A focus of content